IN THE CLAIMS:

Claims 1 through 3 were previously cancelled. Claims 4 and 6 have been amended herein. All of the pending claims are presented below. This listing of claims will replace all prior versions and listings of claims in the application. Please enter these claims as amended.

Listing of Claims:

1. (Cancelled)

2. (Cancelled)

3. (Cancelled)

4. (Currently amended) A method for estimating the partial pressure of carbon dioxide in ~~alveolar blood (PACO₂)~~ alveoli (P_ACO_2) of an individual, comprising:
calculating a concentration of carbon dioxide in the parallel deadspace (PDS_{CO_2}) of an airway of the individual;
determining an end tidal partial pressure of carbon dioxide ($etCO_2$) of the individual; and
estimating the partial pressure of carbon dioxide in alveolar blood using the concentration of carbon dioxide in the parallel dead space of an airway and end tidal partial pressure of carbon dioxide.

5. (Original) The method of claim 4, further comprising determining a perfusion ratio (r).

6. (Currently amended) The method of claim 5, wherein:
~~PACO₂~~ (P_ACO_2) = [$etCO_2$ - (1 - r) × PDS_{CO_2}]/r.

9

7. (Previously presented) The method of claim 4, wherein calculating comprises calculating the concentration of carbon dioxide in the parallel deadspace of an airway of the individual on a breath-by-breath basis.

8. (Previously presented) The method of claim 4, wherein calculating comprises:

determining a mixed inspired volume of carbon dioxide ($ViCO_2$) inhaled by the individual;

at least estimating an airway deadspace of the individual;

determining a partial pressure of end tidal carbon dioxide ($etCO_2$) of a previous breath of the individual; and

determining a tidal volume (V_t) of the individual's breathing.

9. (Previously presented) The method of claim 8, wherein calculating further comprises:

at least estimating a functional residual capacity (FRC) of alveoli of lungs of the individual.

10. (Original) The method of claim 9, wherein

$$PDS_{CO_2}(n) = \{[FRC/(FRC + V_t)] \times PDS_{CO_2}(n-1)\} +$$
$$(\{[ViCO_2 + (deadspace \times etCO_2(n-1))]/V_t\} \times [V_t/(V_t + FRC)]),$$

where (n) indicates a parameter for a current breath and (n-1) represents a parameter for an immediately preceding breath.